

What is claimed is:

1. A method of manufacturing a crystal of a III-V compound of the nitride system, the method comprising a growth step of growing a crystal of a III-V compound of the nitride system having a predetermined thickness on the surface of a basal body,

wherein the growth step comprises

forming a plurality of patterns in separate positions in the direction of the thickness of the crystal, and

the plurality of patterns at least partly overlie one another in the direction of the thickness of the crystal and at least partly do not overlie one another in the direction of the thickness of the crystal.

2. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 1,

wherein each of the plurality of patterns takes form in pattern elements arranged in one direction in a plane almost parallel to the surface of the basal body.

3. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 2,

wherein the pitch of pattern elements of one of the plurality of patterns and the pitch of pattern elements of another of the plurality of patterns are different from each other.

4. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 3,

wherein the relationship between the pitch of the pattern elements of one of the plurality of patterns and the pitch of the pattern elements of another of the plurality of patterns is:

$$0.1 \mu\text{m} < p_1 \times p_2 / |p_2 - p_1| < 5000 \mu\text{m}$$

where  $p_1$  denotes the pitch of the pattern elements of one of the plurality of patterns and  $p_2$  denotes the pitch of the pattern elements of another of the plurality of patterns.

5. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 2,

wherein at least one of the plurality of patterns has pattern elements arranged in a plurality of different pitches.

6. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 2,

wherein at least one of the plurality of patterns has pattern elements arranged at a plurality of different intervals or has pattern elements of a plurality of different lengths in the direction of the arrangement of the pattern elements.

7. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 2,

wherein the pattern elements of each of the plurality of patterns are in the form of stripes.

8. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 1,

wherein each of the plurality of patterns takes form in pattern elements arranged in two directions in a plane almost parallel to the surface of the basal body.

9. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 8,

wherein there are a region where the plurality of patterns overlies one another in the direction of the thickness of the crystal and a region where the plurality of patterns do not overlie one another in the direction of the thickness of the crystal, and both regions coexist in one direction of the two directions.

10. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 8,

wherein there are a region where the plurality of patterns overlies one another in the direction of the thickness of the crystal and a region

where the plurality of patterns do not overlies one another in the direction of the thickness of the crystal, and both regions coexist in both of the two directions.

11. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 1,

wherein the growth step comprises:

a first pattern formation step in which a first pattern is formed directly on the basal body or on the basal body with a predetermined base layer in between;

a first growth step in which an intermediate layer as part of the crystal is deposited on the surface of the basal body or on the surface of the base layer with the first pattern formed thereon;

a second pattern formation step in which a second pattern is formed on the surface of the intermediate layer deposited in the first growth step; and

a second growth step in which a top layer as part of the crystal is deposited on the surface of the intermediate layer with the second pattern formed thereon.

12. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 11,

wherein at least one of the first pattern and the second pattern is comprised of a masking material.

13. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 12,

wherein the masking material includes silicon (Si) and at least one selected from the group consisting oxygen (O) and nitrogen (N).

14. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 11,

wherein the basal body comprises sapphire ( $\text{Al}_2\text{O}_3$ ), silicon (Si), silicon carbide (SiC), gallium arsenide (GaAs), magnesium aluminum composite oxide ( $\text{MgAl}_2\text{O}_4$ ), lithium gallium composite dioxide ( $\text{LiGaO}_2$ ) or gallium nitride (GaN).

15. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 11,

wherein the base layer is deposited by growing a III-V compound of the nitride system on the basal body.

16. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 15,

wherein the first pattern formation step comprises forming the first pattern by selective deposition of a masking material on the surface of the base layer,

and the growth step further comprises,

between the first pattern formation step and the first growth step,  
a step of etching the base layer through the first pattern as a mask.

17. A method of manufacturing a crystal of a III-V compound of  
the nitride system as claimed in claim 15,

wherein the second pattern formation step comprises forming the  
second pattern by selective deposition of a masking material on the  
intermediate layer deposited in the first growth step,

and the growth step further comprises,

between the second pattern formation step and the second growth  
step,

a step of etching the intermediate layer through the second pattern  
as a mask; and

a step of removing the masking material of the second pattern.

18. A method of manufacturing a crystal of a III-V compound of  
the nitride system as claimed in claim 11,

wherein the first pattern formation step comprises

forming the first pattern by forming an indentation in the surface  
of the basal body or in the surface of the base layer.

19. A method of manufacturing a crystal of a III-V compound of  
the nitride system as claimed in claim 11,

wherein the second pattern formation step comprises

forming the second pattern by forming an indentation in the surface of the intermediate layer deposited in the first growth step.

20. A method of manufacturing a crystal of a III-V compound of the nitride system as claimed in claim 11,

further comprising

a step of separating at least the basal body from the crystal.

21. A crystal substrate of a III-V compound of the nitride system, the crystal substrate having a plurality of patterns formed in separate positions in the direction of the thickness of the crystal substrate,

wherein the plurality of patterns at least partly overlies one another in the direction of the thickness of the crystal substrate, and at least partly do not overlie one another in the direction of the thickness of the crystal substrate.

22. A crystal film of a III-V compound of the nitride system, the crystal film having a plurality of patterns formed in separate positions in the direction of the thickness of the crystal film,

wherein the plurality of patterns at least partly overlies one another in the direction of the thickness of the crystal film and at least partly do not overlie one another in the direction of the thickness of the crystal film.

23. A method of manufacturing a device by forming a

predetermined device film on the surface of a crystal substrate or a crystal film, the method comprising:

a growth step in which the crystal substrate or the crystal film is formed by growing a crystal of a III-V compound of the nitride system having a predetermined thickness on the surface of a basal body; and

a device film formation step in which the predetermined device film is formed on the crystal substrate or on the crystal film,

wherein the growth step comprises

forming a plurality of patterns in separate positions in the direction of the thickness of the crystal, and

the plurality of patterns at least partly overlie one another in the direction of the thickness of the crystal and at least partly do not overlie one another in the direction of the thickness of the crystal.

24. A method of manufacturing a device as claimed in claim 23, further comprising

a step of separating the basal body from the crystal substrate or from the crystal film.